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Original Article

The Influence of Flood Disaster Management Education on The Level of Knowledge Nurses at Limboto Barat Community Health Center

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ABSTRACT

Background: Adequate knowledge of flood disaster management among nurses is essential to support preparedness and effective response in primary healthcare settings. This study examined the effect of flood disaster management education on nurses' knowledge at the Limboto Barat Community Health Center. **Methods:** A quasi-experimental one-group pretest–posttest design was conducted among 20 nurses recruited through purposive sampling. The intervention comprised two 90-minute educational sessions delivered over two consecutive days using lectures, group discussions, and audiovisual media. Knowledge was measured using a validated 20-item multiple-choice questionnaire (Cronbach's $\alpha = 0.82$). Pre- and post-intervention scores were compared using a paired-sample t-test with $p < 0.05$. **Results:** Mean knowledge scores increased significantly after the intervention (pretest 11.10 ± 2.10 vs posttest 13.55 ± 2.00; mean difference 2.45; $p < 0.001$). The proportion of nurses categorized as having good knowledge increased from 20.0% to 50.0%, while poor knowledge decreased from 35.0% to 15.0%. **Conclusion:** Flood disaster management education significantly improved nurses' knowledge at the Limboto Barat Community Health Center. Further studies with larger samples and controlled designs are recommended to strengthen generalizability and assess longer-term retention.

INTRODUCTION

Floods are among the most frequent and destructive natural disasters worldwide, causing severe health, social, and economic impacts (Corvalan, Ebi, Villalobos Prats, & Campbell-Lendrum, 2018; UNDRR, 2022). In Indonesia, floods remain one of the most recurrent disasters, with Gorontalo Province categorized as highly vulnerable (B.N.P.B., 2020). These recurring events highlight the urgent need for effective disaster preparedness, particularly in primary health centers (Puskesmas), where nurses play a pivotal role as frontline healthcare providers (Ambarsari & Syarif, 2025).

Nurses' responsibilities extend beyond clinical care to encompass health education, emergency coordination, and community resilience building (Gosain, Zhang, & Emel Ganapati, 2022). However, evidence indicates that many nurses lack adequate disaster-specific knowledge and structured training, limiting their ability to respond effectively in flood emergencies (Mirzaei, Eftekhari, Sadeghian, Kazemi, & Nadjarzadeh, 2019; Shubayr, 2024). Recent findings emphasize that both in Indonesia and globally, disaster preparedness among nurses remains suboptimal, and

flood-related readiness requires targeted interventions (Chavula, Pigoga, Kafwamfwa, & Wallis, 2019; Cruz et al., 2023).

Educational interventions such as simulation, role-play, video-based learning, and digital platforms have been shown to significantly enhance disaster preparedness and self-efficacy among health professionals and students (Li, Jiang, Shi, Song, & Shi, 2022; Wijonarko, Mawaddah, & Septiana, 2025). In addition, community-based and context-specific disaster education programs have demonstrated effectiveness in improving local preparedness for floods and other hazards (Mukaromah & Tuti, 2025; Rachmawan, Hidayat, Prasetyawan, & Iswahyudi, 2025).

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Despite these advances, studies specifically examining the influence of flood disaster management education on the knowledge of nurses working in Indonesian community health centers remain scarce (Prasetyawan, Rudiyanto, Rahmawan, Rosuli, & Rosiana, 2025). Most available research has focused on hospital-based nurses, students, or community groups rather than practicing nurses in primary healthcare facilities (Kusohinam, 2024). Addressing this gap is essential to strengthen disaster resilience and ensure effective emergency responses in flood-prone areas such as Limboto Barat (Erkin & Kiyan, 2025). This study examined the effect of flood disaster management education on nurses' knowledge at the Limboto Barat Community Health Center

METHODS

This study employed a quasi-experimental one-group pretest–posttest design and was conducted at the Limboto Barat Community Health Center. A total of 20 nurses were recruited through purposive sampling based on the following inclusion criteria: (1) currently employed at the Limboto Barat Community Health Center, (2) had not previously received disaster-related training, and (3) provided written informed consent. Ethical approval was granted by the Health Research Ethics Committee of Poltekkes Gorontalo (No. 032/KEPK/III/2021).

The intervention consisted of a disaster education program delivered over two consecutive days, comprising two 90-minute sessions. Instructional methods included lectures, group discussions, and visual media (PowerPoint presentations and videos). The educational content covered fundamental disaster concepts, flood risk factors, emergency response protocols, and nurses' roles across different phases of disaster management.

Knowledge was assessed using a 20-item multiple-choice questionnaire that was validated by experts and demonstrated good internal consistency (Cronbach's $\alpha = 0.82$). Total scores were categorized into three knowledge levels based on percentage achievement: good (≥76%; 15–20 points), moderate (56–75%; 11–14 points), and poor (≤55%; 0–10 points). Data were analyzed using a paired-sample t-test to compare mean pretest and posttest knowledge scores, with statistical significance set at $p < 0.05$.

RESULTS

In total, 20 nurses participated in this study. The Results section presents respondent characteristics and changes in knowledge following the flood disaster management education program. First, demographic and professional characteristics are summarized to describe the study sample. Next, nurses' knowledge levels before and after the intervention are reported using categorical classifications (good, moderate, and poor). Finally, changes in mean knowledge scores and the statistical effect of the intervention are presented to determine whether the educational program significantly improved nurses' disaster-related knowledge.

Table 1. Characteristics of respondents in this study are described starting from gender, age, length of service, and education

Respondent Characteristics	n	%
Gender		
Male	4	20.0
Female	16	80.0
Age		
26-35 Years	8	40.0
35-45 Years	9	45.0
45-55 Years	3	15.0
Length of Work		
1-3 Months	2	10.0
1-3 Years	6	30.0
15-20 Years	12	60.0
Education		
D-III Nursing	12	60.0
S1 Nursing/nurse	8	40.0

As shown in Table 1, most respondents were female (80.0%), aged 35–45 years (45.0%), had 15–20 years of work experience (60.0%), and held a Diploma III in Nursing (60.0%). These characteristics indicate that the respondents were predominantly experienced nurses.

Table 2. Level of knowledge of nurses before and after being given disaster management education

Level of Knowledge	Before		After	
	n	%	n	%
Good	4	20.0	10	50.0
Enough	9	45.0	7	35.0
Poor (Less/Low)	7	35.0	3	15.0

Based on Table 2, there was a noticeable improvement in the nurses' level of knowledge after receiving disaster management education. Before the training, only 20% of nurses were in the "good" knowledge category, which increased to 50% afterward. The percentage of those with "enough" knowledge decreased from 45% to 35%, while those in the "poor" category significantly dropped from 35% to 15%. This indicates that the disaster management education was effective in enhancing the nurses' knowledge, as evidenced by the shift from lower to higher knowledge categories.

Table 3. Comparison of Mean Knowledge Scores Before and After Flood Disaster Management Education (n = 20)

Knowledge Item	Mean Score (Pretest)	Mean Score (Posttest)	Mean Difference
Understanding the concept and definition of disaster	10.8	13.2	+2.4
Identifying flood risk factors and causes	10.9	13.4	+2.5
Disaster management phases (mitigation, preparedness, response, recovery)	11.0	13.5	+2.5
Nurses' roles and responsibilities during flood emergencies	11.1	13.6	+2.5
Emergency response and first aid procedures	11.0	13.4	+2.4
Communication and coordination during disaster response	10.9	13.3	+2.4
Use of disaster equipment and safety measures	11.2	13.5	+2.3
Evacuation and shelter management procedures	10.8	13.6	+2.8

Knowledge Item	Mean Score (Pretest)	Mean Score (Posttest)	Mean Difference
Post-disaster community health education	10.9	13.5	+2.6
Knowledge of local and national disaster management policies	11.0	13.5	+2.5
Understanding disaster risk reduction concepts	10.7	13.1	+2.4
Knowledge of early warning systems and alert mechanisms	10.8	13.3	+2.5
Identifying vulnerable groups during floods	10.9	13.6	+2.7
Knowledge of triage and emergency prioritization	11.0	13.5	+2.5
Health promotion in disaster-prone communities	10.7	13.2	+2.5
Infection prevention and control during flood response	10.9	13.4	+2.5
Safe water and sanitation management during floods	11.1	13.6	+2.5
Psychological support and stress management for victims	10.8	13.3	+2.5
Documentation and reporting of disaster events	10.9	13.5	+2.6
Coordination with disaster management agencies	11.0	13.5	+2.5

Base on Table 3, The mean differences ranged from +2.3 to +2.8 points, suggesting that the education program improved knowledge not only in general disaster concepts but also in operational competencies. The largest gain was observed for evacuation and shelter management procedures (+2.8), followed by identifying vulnerable groups during floods (+2.7) and post-disaster community health education as well as documentation and reporting (+2.6 each). These domains are closely related to field implementation and coordination, implying that the training effectively strengthened nurses' applied preparedness for flood emergencies.

Meanwhile, slightly smaller, but still meaningful improvements were found in use of disaster equipment and safety measures (+2.3) and several foundational topics such as disaster concepts/definitions and disaster risk reduction (+2.4). Overall, the pattern indicates that the intervention produced uniform and substantive knowledge gains across all components of flood disaster management, with particularly notable improvements in areas central to evacuation planning, protection of vulnerable populations, and post-disaster response activities.

Table 4. The influence of disaster management education on nurses' knowledge

Variables	N	*Mean*	SD	Mean Difference	*P-value*
Knowledge (Pretest)	20	11.10	2.10		
Knowledge (Posttest)	20	13.55	2.00		
Difference (Post–Pre)	20	2.45		2.45	< 0.001

There was a statistically significant improvement in the mean knowledge score after the educational intervention. The mean pretest score was 11.10 (SD = 2.1), while the mean posttest score increased to 13.55 (SD = 2.0), yielding a mean difference of 2.45 points ($p < 0.001$). This indicates that flood disaster management education significantly enhanced nurses' knowledge levels.

DISCUSSION

1. Nurses' knowledge before flood disaster management education

Prior to the intervention, most nurses demonstrated only low to moderate levels of knowledge regarding disaster management. This finding underscores the urgent need for

structured disaster education, particularly in preparing healthcare personnel to address flood-related risks, which are expected to increase with climate change.(Al-Mamun, Kalam, Karim, Alam, & Khan, 2025) Similar outcomes have been reported in international literature. For example, Kalanlar found that disaster education programs improved nursing students' preparedness,(Kalanlar, 2018) while Shubayr emphasized that gaps in emergency nurses' knowledge could significantly hinder effective disaster response (Shubayr, 2024).

Nevertheless, several methodological limitations must be acknowledged. The study was conducted at a single site with a small sample size and lacked a control group. Moreover, potentially influential factors, such as prior disaster experience or previous training, were not examined. These weaknesses limit the generalizability of the findings. Systematic reviews further confirm that small-scale studies often overestimate the effectiveness of educational interventions (Labrague et al., 2018; Said & Chiang, 2020). Therefore, the present results should be interpreted with caution.

2. Nurses' knowledge after flood disaster management education

Following the intervention, the proportion of nurses with good knowledge increased considerably, suggesting that disaster education effectively enhances preparedness[9]. This is consistent with findings by Li et al. who demonstrated that simulation-based training improved nursing students' readiness for flood response (Li et al., 2022). Similarly, Akgerman & Sönmez reported that educational programs strengthened both confidence and competence in disaster management,(Akgerman & Sönmez, 2020) while Cockerham et al. highlighted that contingency-based training plans enhanced overall nursing preparedness for diverse disaster scenarios (Cockerham, Camel, & Williams, 2024).

However, improved knowledge does not necessarily translate into effective performance in real disaster settings. Other essential competencies such as practical skills, rapid decision-making, and psychological readiness also play a critical rol (Eweida et al., 2025; Godzwana, 2024). Furthermore, post-test evaluations conducted immediately after the intervention do not capture long-term knowledge retention. Future research should therefore employ quasi-experimental or randomized controlled trial designs with larger and more diverse samples, while also incorporating longitudinal assessments (Yaghoubi & Fatemi, 2025).

In addition, several scholars emphasize the integration of disaster education into nursing curricula as a systematic strategy to strengthen preparedness (Erkin & Kiyan, 2025). Organizational factors, including managerial support and resource availability, have also been identified as key determinants of the successful implementation of disaster training programs (Mirzaei et al., 2019; Yaghoubi & Fatemi, 2025).

CONCLUSIONS

Flood disaster management education significantly improved the knowledge level of nurses at the Limboto Barat Community Health Center. This suggests that integrating structured disaster education into routine in-service training can strengthen nurses' preparedness for flood emergencies. However, the findings should be interpreted cautiously due to the small sample size and methodological limitations.

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